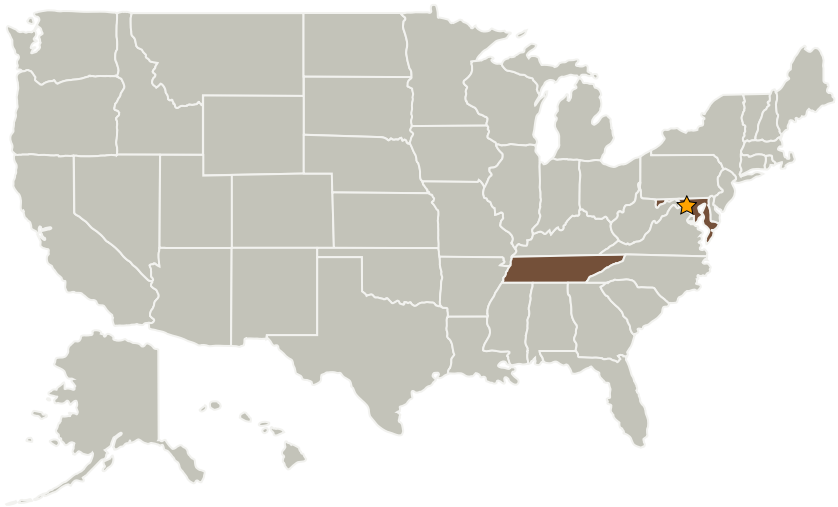
Cryogenic Rotary Piezoelectric Motor, Phase II

Completed Technology Project (2009 - 2011)

Project Introduction

Piezoelectric motors operate on the principal of converting the high-frequency oscillation of high-force, precision ceramic elements into useful continuous motion. High-power oscillations are converted to rotary motion through novel transmission mechanisms to produce high-torque, precision motion. Dynamic Structures and Materials (DSM) focused the Phase I innovation on the development and design of a precision rotary motor mechanism that employs piezoelectric oscillatory power and produces rotary motion for operation at cryogenic and extreme environments. The successful design of a high-torque prototype mechanism and the subsequent Phase I demonstration of the prototype under vacuum conditions lays the groundwork for the technology to reach product status and commercialization success in both NASA and non-NASA applications. Phase II efforts will refine the innovation with additional focus on developing the fundamental understanding of rotary piezoelectric motor design and implementation. The Phase II prototypes will be fully characterized over a temperature range of approximately 25K to 400 K in hard vacuum. The construction materials of this type of mechanism are inherently vacuum compatible and will be selected to provide very low or no outgassing. DSM has already demonstrated operation of its high-force linear piezoelectric motors for environments as low as 77 K.

Primary U.S. Work Locations and Key Partners



Cryogenic Rotary Piezoelectric Motor, Phase II

Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Cryogenic Rotary Piezoelectric Motor, Phase II

Completed Technology Project (2009 - 2011)

Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Dynamic Structures and Materials, LLC	Supporting Organization	Industry	Franklin, Tennessee

Primary U.S. Work Locations	
Maryland	Tennessee

Project Transitions

March 2009: Project Start

March 2011: Closed out

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.3 Mechanical Systems
    - TX12.3.7 Mechanism Life Extension Systems